Mathematics

A Blueprint for Learning

The ***Blueprint for Learning*** is a companion document for the Tennessee Curriculum Standards which are located at www.tennessee.gov/education. Although the curriculum adopted by the State Board of Education in its entirety remains on the web for additional reference, this reformatted version makes the curriculum more accessible to classroom teachers.

Key features of the reformatted version are:

- All grades for each content area are provided in the same manual.
- The skills within each grade are identified as to whether they are introduced, developed, or have been mastered and are now being maintained at that level.
- The skills correlating with the state criterion referenced test (CRT) are also identified for classroom instruction.
- In the Language Arts section, the assessed skills (performance indicators) are identified not only for the state's CRT in grades 3-8 but also for the writing assessment in grades 5 and 8.
- This guide makes the planning of instruction for students with varying abilities easier to accomplish.
- Teachers can plan and work together to improve school wide student achievement through curriculum integration across content areas and grade levels.
- Teachers can identify current grade level skills as well as those needed to prepare students for the next year.

Skills are coded and identified as Introduced (I), Developing (D), State CRT and Writing Assessed (A), and Mastered and Maintained (M).

- Introduced (I) skills are new skills presented at that grade level. Even though a skill is considered introduced at a grade level, some development would also occur.
- Developing (D) skills are skills that have been introduced at a previous grade level. At this stage of development the skills are being refined and expanded.
- Assessed (A) skills are those skills that are correlated to the state performance indicators for the CRT portion of the achievement test (grades 3-8) and the writing assessment (grades 5 and 8). The identified skills are formally assessed through the CRT; however, all skills are informally assessed in the classroom.
    - For the purpose of data reporting, assessed (A) skills are grouped into categories indicating related skills and knowledge. For example, grammar, mechanics, and usage are grouped together under the grammar (G) category. Each state assessed indicator included on the Blueprint carries a legend showing that it is assessed and indicating the category in which it will be reported (e.g., Assessed/Grammar=A/G).
- Mastered and Maintained (M) indicates a skill that has been introduced, developed, and assessed. Even though a skill may be formally assessed, the development and expansion of the skill still continues.

MATHEMATICS
Kindergarten

NUMBER AND OPERATION

The student will identify, represent, order, and compare numbers and compute and solve problems.

Key	Reporting Category	
I/D		Count how many objects are in a set (1-20).
I		Count to 50 by 1's and 10's.
I		Count backward from 10 to 1.
I		Match quantities up to 20 with numerals.
I/D		Identify equivalent sets of objects by one-to-one correspondence.
I		Identify and write numerals 0-20.
I		Represent quantities up to 20 on ten - frames.
I		Determine if a figure has been divided into halves.
I/D		Identify and name coins (penny, nickel, dime, quarter, and half dollar) and their values.
I		Order numbers less than 20.
I		Express the relationship between two numbers less than 20 using the words less than, more than, or equal to.
I		Identify the position of a whole number less than 20 on a number line.
I		Use the language of ordinal numbers up to tenth.
I		Use concrete objects to develop strategies for addition and subtraction of whole numbers.
I		Solve simple word problems involving whole numbers 0-10.
I		Use words, actions, pictures, or concrete objects to solve problems.
I		Use pictures or objects to show one more or one less than any number to 20.
I		Explain if the solution to a word problem is reasonable.

ALGEBRA

The student will sort and classify objects; create, extend, and describe patterns; and represent number sentences with words, objects, and pictures.

I/D		Sort objects by color, size, shape, and kind.
I		Use mathematical terms appropriately.
I		Identify patterns in the environment, in arrangements of objects, or in pictures.
I		Recognize and extend a concrete, visual, or auditory two- or three-part repeating pattern.
I		Create and describe a simple repeating pattern of numbers or figures.
I		Use concrete objects or pictures to demonstrate addition and subtraction number sentences involving numbers 0 to 5.
I		Read and explain simple addition and subtraction number sentences.

KEY
I = Introduced D = Developing A = State Assessed M = Mastered

REPORTING CATEGORY
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DP = Data Analysis & Probability ME = Measurement G = Geometry GR = Graphs & Graphing

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All the skills ("I" … "D" … "A" … "M") are addressed in classroom assessment.

GEOMETRY

The student will identify, describe, and create basic shapes and describe relative positions and directions.

I		Match terms with given shapes (circles, squares, triangles, and rectangles) when shown in various positions.
I		Recognize circles, squares, triangles, and rectangles in the environment and as faces of three-dimensional objects.
I		Recognize basic properties of and similarities and differences between simple geometric figures (e.g., number of sides, corners).
I		Reproduce and create circles, squares, rectangles, and triangles.
I		Reproduce and create structures using three-dimensional shapes.
I		Combine two-dimensional shapes to make pictures.
I		Recognize and show terms of relative position and direction in a variety of situations (e.g., over, under, forward, backward, between, right, and left).

MEASUREMENT

The student will apply measurement concepts of time, length, weight, capacity, and temperature.

I		Demonstrate understanding of the concept of length.
I		Recognize and show which is larger/smaller, longer/shorter, taller/shorter, heavier/lighter or which holds more/holds less, when given two similar objects.
I/D		Use words to describe time (e.g., day, night, morning, afternoon, yesterday, today, and tomorrow).
I/D		Use words to describe temperature (e.g., hot, warm, cool, and cold).
I		Measure and estimate length of an object using a variety of nonstandard units.
I		Distinguish between light and heavy objects.
I		Recognize clocks and watches as instruments for measuring time and tell time to the hour.
I		Recognize a thermometer as a device to measure temperature.
I/D		Recognize a calendar as a way of measuring time.

DATA ANALYSIS AND PROBABILITY

The student will make simple graphs using concrete objects and pictures and describe events as likely or unlikely.

I		Represent and compare data using concrete objects, pictures, and simple graphs.
I		Describe events related to students' experiences as likely or unlikely.

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MATHEMATICS
First Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers and compute and solve problems.

Key	Reporting Category	
I/D		Count by 2's, 5's, and 10's to 100.
D		Count how many objects are in a set by 1's to 100.
I		Count how many objects are in a set by 2's, 5's, and 10's up to 30.
D		Count forward or backward by one beginning with any number less than 100.
I		Identify the place value of a digit in numbers to 99.
D		Read and write numerals up to 100.
I		Count by 10's from any number using a hundreds chart.
I/D		Use concrete objects to model whole numbers to 99 (e.g., base-ten blocks, sticks, and straws).
I		Identify odd and even whole numbers to 50.
I/D		Match halves and fourths to shaded regions of a single object or figure.
I		Show 1/2 and 1/4 of a set of objects.
I		Match the spoken, written, concrete, and pictorial representations of 1/2 and 1/4.
I/D		Recognize one whole as two halves or four fourths.
I/D		Count the value of a set of coins up to 50 cents.
D		Sequence and order whole numbers less than 100.
I		Represent numbers in flexible ways using a variety of materials (e.g., 23 as 23 ones, 1 ten and 13 ones, and/or 2 tens and 3 ones).
D		Identify and use ordinal numbers up to twelfth.
I		Compare whole numbers through 100 using the appropriate symbol (e.g., <, >, and =).
I		Use a number line or hundreds grid to find one more or one less than any number to 50.
D		Explain whether the solution to a word problem is reasonable.
D		Solve simple story problems involving addition and subtraction with numbers less than 20.
I		Develop story problems that illustrate basic addition and subtraction facts.
D		Use words, actions, pictures, and concrete objects to solve problems.
D		Use pictures or objects to show one more or one less than any number to 99.
I		Estimate the number of objects in a group and explain the reasoning for the estimate.
I		Explain and justify solutions and strategies in problem solving.
I		Add and subtract up to two-digit whole numbers using various strategies (e.g., counting up or back, taking away, doubles plus one, comparison, number relationships, and modeling).
I		Use calculators in problem-solving situations.

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ALGEBRA

The student will sort and classify objects; create, extend, and describe patterns; and represent number sentences with words, objects, and pictures.

D		Sort objects by two of the following attributes: color, size, shape, and kind.
I		Describe how objects in a group are alike and how they are different.
D		Identify and describe growing patterns found in literature, in the environment, in physical arrangements, and in pictures.
D		Translate a repeating pattern from one format to another (e.g., red-blue-blue to snap-clap-clap).
D		Create, describe, and extend concrete, visual, auditory, or number patterns.
I		Identify the unit of a two-part repeating pattern.
D		Show or represent number sentences, involving addition and subtraction and numbers 0-20, with concrete objects.
D		Use mathematical terms and symbols appropriately.
I		Interpret and solve simple open addition sentences, including finding the missing addend.
I		Apply the commutative property of addition.

GEOMETRY

The student will identify, describe, and create basic shapes and describe relative positions and directions.

D		Recognize names, basic properties of, and similarities and differences between simple geometric figures (e.g., number of sides, corners).
D		Predict and describe the results of combining and taking apart two- and three-dimensional geometric figures.
D		Recognize and show terms of relative position and direction in a variety of situations (e.g., over, under, forward, backward, between, right, and left).
I		Create a figure made up of shapes from memory.
D		Identify the position of a whole number on the number line.

MEASUREMENT

The student will apply measurement concepts of time, length, weight, capacity, and temperature.

D		Compare and order objects according to length, capacity, and weight.
D		Recognize the need for standard units of measurement.
D		Demonstrate understanding of the concept of length.
D		Measure and estimate length using a variety of nonstandard units.
I		Use a ruler to measure a line segment to the nearest inch or centimeter.
I		Use scales to weigh an object to nearest pound or kilogram.
D		Recognize that a calendar is a way of measuring time.
I		Mark specified days and dates on a calendar and describe the relationship between days and months.
D		Determine time to the nearest hour and half-hour, using a standard clock.
I		Compare units of time.
D		Use a thermometer to measure temperature and determine the hotter/colder temperature by selecting the higher/lower column of two thermometers.

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DATA ANALYSIS AND PROBABILITY

The student will make simple graphs using concrete objects and pictures and describe events as likely or unlikely.

D		Interpret and make pictographs and bar graphs using concrete objects and pictured objects.
D		Describe events related to students' experiences as likely or unlikely.

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MATHEMATICS
Second Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers and compute and solve problems.

Key	Reporting Category	
D		Count a set of objects to 100 by 2's, 3's, 5's, or 10's.
D		Count forward and backward by one from any number less than 999.
D		Read and write numerals to 999.
D		Identify the place value of a digit in numbers to 999.
D		Identify odd and even numbers to 100.
I		Use concrete models or pictures to show whether a fraction is less than 1/2, more than 1/2, or equal to 1/2.
D		Match the spoken or written word names and concrete or pictorial representations (parts of regions or parts of sets of objects) of halves, thirds, and fourths.
I		Compare the unit fractions 1/2, 1/3, and 1/4.
D		Determine the value of a collection of coins up to $1.00.
D		Order and sequence whole numbers less than 1000.
D		Compare two numbers using the appropriate symbol (i.e., <, >, and =).
D		Represent numbers to 999 in flexible ways using a variety of materials (e.g., 23 as 23 ones, 1 ten and 13 ones, and/or 2 tens and 3 ones).
D		Use and match numerals to ordinal numbers through twentieth.
D		Develop a story problem that illustrates a given addition or subtraction number sentence.
I		Use the number line to demonstrate addition and subtraction.
I		Write and identify number sentences that describe situations involving addition and subtraction.
I		Write and explain related addition and subtraction sentences.
D		Solve story problems involving numbers to 100.
D		Check for the reasonableness of solutions.
D		Use calculators in problem-solving situations.
D		Add and subtract efficiently and accurately with single-digit numbers up to sums of 18.
D		Add and subtract two-digit whole numbers using a variety of strategies and representations.
D		Explain and justify solution strategies used in problem solving.
D		Use estimation to justify whether the answer to a computation is reasonable.

ALGEBRA

The student will sort and classify objects; create, extend, and describe patterns; and represent number sentences with words, objects, and pictures.

D		Sort objects by two or more attributes.
D		Identify the rules by which objects or numbers have been sorted.
D		Extend a growing pattern, involving objects, shapes, or numbers.

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D		Identify the unit of a three-part repeating pattern.
D		Translate a repeating pattern from one format to another (e.g., red-blue-blue to snap-clap-clap).
I		Determine the output number for a particular input number given a one-operation rule involving addition or subtraction.
D		Interpret and solve open sentences that involve addition or subtraction.
D		Communicate and use mathematical terms and symbols appropriately.
D		Show or represent number sentences, involving addition and subtraction and numbers 0-20, with concrete objects.
D		Demonstrate knowledge of and use the commutative property of addition.
I		Show that subtraction is not commutative.
D		Apply the addition and subtraction properties of 0 (adding or subtracting 0 doesn't change a given number).
I		Describe qualitative change (e.g., a student growing taller).
I		Describe quantitative change (e.g., a student growing 2 inches in 1 year).

GEOMETRY

The student will identify, describe, and create basic shapes and describe relative positions and directions.

D		Identify, build, draw, and compare two- and three-dimensional geometric figures.
D		Describe characteristics and parts of two- and three-dimensional geometric figures.
I		Identify shapes that have line symmetry.
D		Investigate and predict the results of combining and taking apart two- and three-dimensional geometric figures.
M		Identify the position of a whole number on the number line.
I		Illustrate flips, slides, and turns using concrete objects and pictures.

MEASUREMENT

The student will apply measurement concepts of time, length, weight, capacity, and temperature.

D		Compare and order objects according to length, capacity, and weight.
I		Demonstrate understanding of the concepts of perimeter and area.
I		Identify what can be measured about objects in the environment.
D		Identify time to the hour, half-hour, and quarter-hour.
D		Relate days, dates, weeks, and months to a calendar.
D		Explain the relationship between inches and feet.
D		Measure length to the nearest centimeter, foot, half-inch, and inch.
I		Estimate lengths and time intervals.
I		Solve problems involving elapsed time in hours.
I		Measure and estimate weight and capacity using a variety of nonstandard units.
I		Find area and perimeter using nonstandard units.
D		Read thermometers with Fahrenheit and Celsius scales.

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DATA ANALYSIS AND PROBABILITY

The student will make simple graphs using concrete objects and pictures and describe events as likely or unlikely.

I		Pose questions and gather data to answer the questions.
I		Read, interpret, and construct tables using tally marks.
D		Construct pictographs and bar graphs.
D		Interpret and solve problems with tables, bar graphs, and pictographs.
I		Predict outcomes of events based on data gathered and displayed.
M		Explain whether an event is likely or unlikely.

MATHEMATICS
Third Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers and compute and solve problems.

Key	Reporting Category	
A	**N**	Count by 10's, 100's, or 1,000's.
D		Skip count by 10's from any whole number less than 1,000.
D		Read and write whole numbers to 9,999.
A	**N**	Represent whole numbers to 9,999 with models.
A	**N**	Identify whole numbers as odd or even.
A	**N**	Identify the place value of a given digit up to thousands.
A	**N**	Represent whole numbers up to 10,000 in expanded form (e.g., 1,000's + 100's + 10's + 1's).
D		Connect the spoken or written word names and concrete or pictorial representations (regions or sets) of fractions with denominators up to ten.
A	**N**	Connect written and pictorial representations of fractions with denominators up to ten.
A	**N**	Compare fractions with numerators of 1 and denominators up to 10.
I		Compare and order decimal amounts written as money.
A	**R**	Recognize the value of combinations of coins and bills up to $5.
A	**R**	Determine the correct change from a transaction that is less than $1.00.
D		Order and sequence whole numbers up to 4 digits.
A	**N**	Compare and order whole numbers up to 9999 using the appropriate symbol (i.e., <, >, and =).
I		Relate skip counting to multiplication.
I		Connect division to sharing situations.
I/D		Demonstrate multiplication using repeated addition (e.g., arrays).
D		Write and identify number sentences that describe situations involving addition, subtraction, and multiplication.
D		Write and explain related addition and subtraction sentences.
A	**R**	Solve real-world problems using addition or subtraction of whole numbers.
A	**C**	Add and subtract efficiently and accurately with single-digit whole numbers.
A	**C**	Add efficiently and accurately with two- and/or three-digit whole numbers.
A	**C**	Subtract efficiently and accurately with two- and/or three-digit whole numbers.
D		Use a variety of thinking strategies to add and subtract whole numbers (e.g., sums of ten, doubles plus one).
D		Explain the reasonableness of a solution to a computation or to a word problem.
A	**N**	Use estimation to select a reasonable solution in problem solving (addition and subtraction only).
I		Relate adding doubles to multiplying by two.
I		Use known multiplication facts to determine a related product (e.g., 9 x 7 is 7 less than 10 x 7).
A	**C**	Use the multiplication facts 0, 1, 2, 5, and 10 efficiently and accurately.
D		Explain and justify solution strategies used in problem solving.
D		Select and use an appropriate strategy to solve word problems (e.g., organized list, guess and check, diagram, and table).
I		Mentally calculate the sum or difference of any two numbers up to 100.
D		Use strategies, including rounding, to estimate in story problems.

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ALGEBRA

The student will sort and classify objects; create, extend, and describe patterns; and represent number sentences with words, objects, and pictures.

A	**AT**	Sort objects by two attributes.
D		Sort objects by two or more attributes.
M		Devise, carry out, and explain how a group of objects has been sorted.
A	**AT**	Identify the rules by which objects or numbers have been sorted.
D		Recognize, describe, complete, translate, or create patterns of figures or numbers.
A	**AT**	Extend repeating and growing numerical or geometric patterns.
A	**AT**	Represent repeating geometric patterns as repeating numerical patterns.
D		Describe a growing pattern, involving objects, shapes, or numbers.
A	**AT**	Determine the output number for a particular input number given a one-operation function rule involving addition or subtraction.
D		Demonstrate knowledge (with words or symbols) of the commutative properties of addition and multiplication.
D		Show or represent and solve open sentences, involving addition, subtraction, and multiplication, with concrete objects or pictures.
A	**AT**	Solve open sentences that involve addition and subtraction of whole numbers zero to twenty.
A	**AT**	Connect open sentences to real-world situations.
D		Demonstrate knowledge and understanding of grade level mathematical terms.
I		Demonstrate understanding that an equation is a number sentence stating two quantities are equal.
D		Use the commutative property of addition and multiplication.
D		Show that subtraction is not commutative.
M		Apply the addition and subtraction properties of 0 (adding or subtracting 0 doesn't change a number).
I		Apply the zero and identity properties of multiplication (adding 0 or multiplying by 1 doesn't change a number).
I		Use arrays to represent the commutative property of multiplication.
D		Describe qualitative change (e.g., a student growing taller).
D		Describe quantitative change (e.g., a student growing two inches in one year).

GEOMETRY

The student will identify, describe, and create basic shapes and describe relative positions and directions.

D		Identify, build, draw, and compare two- and three-dimensional geometric figures (e.g. rectangle, square, triangle, circle, cube, cylinder, sphere, and cone).
A	**G**	Name two-dimensional geometric figures (e.g., rectangle, square, triangle, circle, cube, cylinder, sphere, and cone).
A	**G**	Name three-dimensional geometric figures (e.g., rectangle, square, triangle, circle, cube, cylinder, sphere, and cone).
A	**G**	Recognize geometric figures that are the same size and shape.
A	**G**	Identify the line of symmetry in a two-dimensional design or shape.
D		Draw lines of symmetry in two-dimensional designs and shape.
I		Identify and draw horizontal and vertical lines.
I		Identify and draw diagonals of polygons.
D		Identify the position of 1/2, 1/3, or 1/4 on the number line.
I		Identify a location on a grid using whole number coordinates.
A	**AT**	Use appropriate mathematical language to find a point on a grid using whole number coordinates.
D		Predict and identify the results of sliding, flipping, or turning two-dimensional shapes.
A	**G**	Identify the result of a transformation that has been applied to a simple two-dimensional geometric shape (i.e., flips or slides).

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MEASUREMENT

The student will apply measurement concepts of time, length, weight, capacity, and temperature.

D		Determine when an estimate of a measurement is sufficient.
D		Demonstrate understanding of the concepts of perimeter, area, and capacity.
A	**R**	Solve real-world problems using a calendar.
A	**R**	Solve real-world problems involving addition and subtraction of one- or two-digit measurements.
D		Use strategies to estimate or determine length, perimeter, area, capacity, weight, time, and temperature.
A	**ME**	Use estimation to determine if a length measurement is reasonable.
D		Explain the relationships among inches, feet, and yards.
D		Measure to the nearest centimeter, foot, half-inch, and inch.
A	**ME**	Measure length to the nearest centimeter and inch.
D		Measure to the nearest liter, cup, pint, quart, and gallon.
D		Measure to the nearest ounce, pound, kilogram, and gram.
D		Find the perimeter of polygons.
A	**ME**	Find the perimeter of a rectangle on a grid.
D		Select and apply the most appropriate standard units of length, area, capacity, weight, time, and temperature.
A	**ME**	Select an appropriate standard unit to measure length.
D		Solve real-world problems involving measurement.
A	**R**	Solve real-world problems involving elapsed time to the half-hour.
A	**ME**	Read thermometers with Fahrenheit and Celsius scales (positive whole number temperatures).
A	**ME**	Read and write time at five-minute intervals.
A	**ME**	Read and write time to the nearest hour, half-hour, and quarter-hour.

DATA ANALYSIS AND PROBABILITY

The student will make simple graphs using concrete objects and pictures and describe events as likely or unlikely.

D		Write questions and gather data to answer questions.
D		Interpret and construct tables using tally marks.
D		Construct pictographs and bar graphs.
A	**DP**	Interpret pictographs.
A	**DP**	Interpret bar graphs.
D		Read and interpret tables, bar graphs, and pictographs.
D		Make and justify predictions based on data gathered and displayed.
D		Identify all possible outcomes of a simple experiment (e.g., spinner, coin toss, and number cubes).
A	**DP**	Determine whether an event is certain, possible, or impossible.
A	**DP**	Determine the most likely, least likely, or equally likely outcomes in simple experiments (i.e., spinner, number or color cube).
A	**DP**	Select all possible outcomes of a simple experiment (i.e., spinner, coin toss, number or color cube).
A	**DP**	Solve real-world problems in which data is represented in tables.

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MATHEMATICS
Fourth Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers; and estimate, compute, and solve problems.

Key	Reporting Category	
A	**N**	Read and write numbers from hundred-thousands to hundredths.
A	**N**	Represent whole numbers to 9999.
A	**N**	Identify the place value of a given digit from hundred-thousands to hundredths.
A	**N**	Compare and order whole numbers to 9999 using the appropriate symbols (>, <, and =).
A	**N**	Identify fractions as parts of whole units, as parts of sets, as locations on number lines, and as divisions of whole numbers.
A	**N**	Generate equivalent forms of whole numbers, commonly used fractions, and decimals.
A	**N**	Represent numbers as both improper fractions and mixed numbers.
D		Use concrete or pictorial representations to compare and order commonly used fractions.
D		Use concrete and pictorial representations to compare decimals.
D		Use various models and equivalent forms to represent, order, and compare whole numbers and commonly used fractions and mixed numbers (e.g., number lines, base ten blocks, expanded notation, Venn diagrams, and hundreds boards).
A	**N**	Represent whole numbers up to 10,000 in expanded form (1,000's + 100's +10's +1's).
D		Demonstrate knowledge and understanding of grade level mathematical terms.
D		Explain the relationship between addition and subtraction.
I		Explain the relationship between multiplication and division.
I		Explain how addition, subtraction, multiplication, and division affect the size and order of numbers.
D		Estimate the results of whole-number computations.
A	**N**	Use estimation to select a reasonable solution to a whole number computation involving addition, subtraction, or multiplication.
A	**C**	Add and subtract fractions with like denominators.
A	**C**	Multiply efficiently and accurately with single-digit whole numbers.
D		Divide efficiently and accurately with single-digit whole numbers.
A	**C**	Add and subtract decimals (includes monetary units).
I		Multiply decimals (includes monetary units).
I		Select appropriate methods and tools for computing with whole numbers (e.g., mental computation, estimation, calculators, paper and pencil, guess and check).
A	**C**	Solve one-step real-world problems involving addition or subtraction of whole numbers and/or decimals.
A	**R**	Solve one-step real-world problems involving multiplication of whole numbers and/or decimals.
I		Identify missing information and/or too much information in word problems.
I		Apply logical reasoning to solve real-world problems.
D		Select the appropriate computational and operational method to solve word problems.
D		Solve story problems using whole numbers, fractions, and decimals (includes money).

KEY
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ALGEBRA

The student will analyze and use symbols to generalize patterns, use properties of operations, and analyze change in various situations.

D		Generalize and extend or complete patterns involving geometric figures or numbers.
A	**AT**	Extend numerical and geometric patterns.
D		Represent and analyze patterns and relationships using words, tables, and graphs.
A	**AT**	Determine the function rule for data in a function table.
A	**AT**	Apply basic function rules.
A	**AT**	Solve open sentences involving addition and subtraction.
A	**AT**	Solve open sentences involving multiplication and division.
A	**AT**	Connect open sentences to real-world situations.
I		Represent the idea of a variable as an unknown quantity by using a letter or a symbol.
D		Demonstrate understanding that an equation is a number sentence stating that two quantities are equal.
D		Use the commutative, associative, zero, and identity properties for addition and multiplication.
I		Investigate how a change in one variable relates to a change in a second variable.

GEOMETRY

The student will analyze and describe characteristics and properties of 2- and 3-dimensional shapes, locate and specify points on a grid, and use geometric concepts (e.g., symmetry and transformations) and reasoning to solve problems.

D		Identify, compare, and analyze attributes of two- and three-dimensional shapes.
A	**G**	Identify two- or three-dimensional shapes given defining attributes.
D		Develop and use mathematical language to describe characteristics and properties of geometric figures.
D		Identify and draw points, lines, line segments, rays, and angles.
A	**G**	Identify points, lines, and rays.
I		Describe the relationships between lines and the characteristics of angles (e.g., parallel, perpendicular, intersecting, right, acute, and obtuse).
D		Compare properties of two- and three-dimensional geometric figures.
D		Investigate and describe the results of subdividing and combining two-dimensional geometric figures.
A	**G**	Recognize congruent geometric figures.
D		Identify and draw lines of symmetry for two-dimensional geometric figures.
A	**G**	Identify lines of symmetry for two-dimensional geometric figures.
A	**AT**	Locate and specify points in Quadrant 1 of a coordinate system.
D		Identify, predict, and describe the results of transformations of two-dimensional geometric figures (i.e., slides, flips, and turns).
A	**G**	Identify the result of a transformation (flip or slide) that has been applied to a simple two-dimensional geometric shape.
I		Describe a motion that will show that two shapes are congruent.
D		Construct and draw two- and three-dimensional geometric figures.
D		Create and describe mental images of objects, patterns, and paths.
I		Use geometric models to solve real-world problems.

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MEASUREMENT

The student will estimate and determine time, length, perimeter, area, weight, capacity, and temperature and solve real-world problems involving measurement.

D		Demonstrate understanding of the concepts of length, perimeter, area, weight, capacity, volume, time, and angle measure.
D		Estimate using standard units of measure.
A	**ME**	Select appropriate standard units to measure length, perimeter, area, capacity, volume, weight, time, temperature, and angles.
A	**ME**	Use estimation to determine if a length or volume measurement is reasonable.
I		Demonstrate understanding that measurements are approximations.
D		Demonstrate understanding of the relationships among units of length.
D		Explore perimeter and area using a variety of models (e.g., geoboards, graph paper).
A	**ME**	Find the perimeter of rectangles.
D		Select and use tools to measure weight and volume in customary or metric units.
A	**ME**	Measure length to the nearest 1/4 inch or nearest centimeter.
A	**ME**	Tell time to the nearest minute.
A	**ME**	Read temperature using Fahrenheit and Celsius thermometers.
D		Develop strategies for estimating the perimeters and areas (such as counting square units) of geometric figures.
A	**ME**	Apply the formula for finding the area of a rectangle.
A	**R**	Solve real-world problems involving addition and subtraction of measurements.
A	**R**	Solve real-world problems involving elapsed time to the quarter-hour.

DATA ANALYSIS AND PROBABILITY

The student will collect, organize, analyze, interpret, and display data in tables and graphs and determine the probabilities of outcomes in simple experiments.

I		Collect data using observations, surveys, and experiments.
I		Understand how data-collection methods could affect the results.
D		Construct tables, pictographs, line graphs, and bar graphs.
D		Interpret simple charts, tables, pictographs, line graphs, and bar graphs.
A	**DP**	Interpret data displayed in bar graphs and pictographs.
A	**DP**	Connect data in tables to pictographs, line graphs, or bar graphs.
I		Evaluate how well various representations show the collected data.
D		Explore and determine measures of central tendency (i.e., mean, median, and mode).
A	**DP**	Determine the median of a data set.
D		Make predictions from data.
I		Design investigations to try to answer a question.
M		Describe the likelihood or chance of events as certain, possible, or impossible.
M		Explain whether an event is likely or unlikely.
A	**DP**	Determine the most likely, least likely, or equally likely outcomes in simple experiments.
A	**DP**	Select all possible outcomes of a simple experiment (i.e., spinner, coin toss, number or color cube)**.**

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MATHEMATICS
Fifth Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers; and estimate, compute, and solve problems.

Key	Reporting Category	
A	**N**	Read and write numbers from millions to thousandths.
A	**N**	Identify the place value of a given digit from millions to thousandths.
A	**N**	Represent whole numbers and two-place decimals in expanded form.
A	**N**	Represent, compare, and order whole numbers and decimals to thousandths.
D		Order and compare (<, >, or =) whole numbers, fractions, mixed numbers, and decimals using models (e.g., number lines, base ten blocks, Venn diagrams, and hundreds boards).
A	**N**	Compare and order fractions using the appropriate symbol (<, >, and =).
D		Demonstrate knowledge and understanding of grade level mathematical terms.
D		Represent proper fractions, improper fractions, and mixed numbers using concrete objects, pictures, and the number line.
A	**N**	Connect symbolic representations of proper and improper fractions to models of proper and improper fractions.
A	**N**	Represent numbers as both improper fractions and mixed numbers.
D		Identify and change improper fractions to mixed numbers and vice versa.
A	**N**	Generate equivalent forms of commonly used fractions, decimals, and percents (e.g., 1/10, 1/4, 1/2, .75, 50%).
D		Recognize relationships among commonly used fractions and decimals.
A	**C**	Multiply a fraction by a multiple of its denominator (denominator less than or equal to 10).
M		Use commutative, associative, and identity properties.
D		Explain and demonstrate the inverse nature of addition and subtraction.
D		Explain and demonstrate the inverse nature of multiplication and division.
D		Explain how addition, subtraction, multiplication, and division affect the size and order of numbers.
D		Select appropriate methods and tools for computations (e.g., mental computation, estimation, calculators, and paper and pencil).
I		Explain why one form of a number might be more useful for computation than another form.
A	**N**	Use estimation to determine a reasonable solution to a whole number computation.
A	**C**	Add, subtract, multiply, and divide whole numbers (multipliers and divisors no more than two-digits).
A	**C**	Add, subtract, and multiply decimals.
A	**C**	Add and subtract commonly used fractions.
D		Identify missing information and/or too much information in real-world problems.
A	**R**	Solve one- or two-step real-world problems involving addition, subtraction, and/or multiplication of whole numbers and decimals.
D		Solve real-world problems using decimals (including money), fractions, and percents.

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ALGEBRA

The student will analyze and use symbols to generalize patterns, use properties of operations, and analyze change in various situations.

D		Generalize and extend or complete patterns involving geometric figures or numbers.
A	**AT**	Extend numerical patterns.
A	**AT**	Extend geometric patterns.
A	**AT**	Generalize numerical patterns using a variable.
D		Represent and analyze patterns and functions using words, tables, and graphs.
D		Determine or apply a function rule involving data in a function table.
A	**AT**	Apply basic function rules.
M		Demonstrate understanding that an equation is a number sentence stating two quantities are equal.
A	**AT**	Solve open sentences involving addition, subtraction, multiplication, and division.
A	**AT**	Connect open sentences to real-world situations.
D		Represent the idea of a variable as an unknown quantity using a letter or a symbol.
A	**AT**	Select an equation that represents a given mathematical relationship.
M		Apply commutative, associative, zero, distributive, and identity properties.
M		Show that division is not commutative.
D		Investigate how a change in one variable relates to a change in a second variable.
D		Use methods to compare and describe situations involving constant and/or varying rates of change and to solve real-world problems (e.g., extending rate charts).
A	**R**	Extend rate charts to solve real-world problems.

GEOMETRY

The student will analyze and describe characteristics and properties of 2- and 3-dimensional shapes, locate and specify points on a grid, and use geometric concepts (e.g., symmetry and transformations) and reasoning to solve problems.

D		Identify, compare, and analyze attributes of two- and three-dimensional figures.
A	**G**	Identify lines of symmetry in two-dimensional geometric figures.
A	**G**	Identify two- or three- dimensional shapes given defining attributes.
D		Use the attributes of geometric figures to develop definitions of the figures.
A	**G**	Identify lines, line segments, rays, and angles.
D		Identify and draw points, lines, line segments, rays, and angles.
D		Draw circles and label diameter, circumference, radius, and center.
A	**G**	Classify geometric figures using properties.
D		Investigate and describe the results of subdividing and combining geometric figures.
D		Recognize, name, compare, and contrast congruent and symmetrical geometric figures.
D		Describe the relationships between lines and the characteristics of angles (e.g., parallel, perpendicular, intersecting, right, acute, obtuse, and straight).
I		Make and test hypothesis about geometric properties.
I		Explore similarity and how the sides and angles of similar triangles are related.
D		Describe location and movement using appropriate mathematical language.
A	**AT**	Locate and specify a point in Quadrant I of a coordinate system.
D		Identify, predict, and describe the results of transformations of two-dimensional figures (i.e., slides, flips, and turns).
A	**G**	Use spatial reasoning to predict the result of sliding, flipping, or turning a two-dimensional shape.

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I		Describe and identify line and rotational symmetry in two-dimensional figures.
D		Describe a motion or a series of motions that will show that two shapes are congruent.
D		Construct and draw two- and three-dimensional geometric figures.
D		Create and describe mental images of objects, patterns, and paths.
D		Recognize and build a 3-dimensional object from a 2-dimensional representation (net) of that object (e.g., cube, rectangular prism, pyramid, cone, or cylinder).
A	**G**	Use spatial reasoning to identify the three-dimensional figure created from a two-dimensional representation (net) of that figure (i.e., cube, rectangular prism, pyramid, cone, or cylinder).
I		Use visualization and spatial reasoning (e.g., geometric models) to solve problems.

MEASUREMENT

The student will determine time, length, perimeter, area, weight, capacity, and temperature and solve real-world problems involving measurement.

D		Demonstrate understanding of the concepts of length, perimeter, circumference, area, weight, capacity, volume, elapsed time, and angle measure.
D		Demonstrate understanding that measurements are approximations.
I		Understand how differences in units affect precision of measurements.
D		Demonstrate understanding of the relationships among the units within both customary and metric systems of measurement.
A	**ME**	Connect simple units of measurement within the same system of measurement.
A	**ME**	Use estimation to determine if a length or volume measurement is reasonable.
A	**ME**	Select appropriate standard units to measure length, perimeter, area, capacity, volume, weight, time, temperature, and angles.
D		Explore what happens to measurements of a two-dimensional shape when the shape is changed in some way (e.g., perimeter, area).
A	**ME**	Use strategies to estimate perimeter and area of rectangles.
D		Select and use appropriate standard units to measure length, perimeter, area, capacity, volume, weight, time, temperature, and angles.
D		Select and use appropriate tools for measuring in real-world situations.
A	**ME**	Use a ruler to measure to the nearest centimeter and ¼ inch.
A	**R**	Solve real-world problems involving addition and subtraction of measurements.
A	**R**	Solve real-world problems involving perimeter and area of rectangles.
A	**R**	Solve real-world problems involving elapsed time.
A	**ME**	Read temperatures on a thermometer using Fahrenheit and Celsius scales.
A	**ME**	Apply formulas to find the area of parallelograms and triangles.
D		Explain and demonstrate how scale in maps and drawings shows relative size and distance.
I		Develop informal strategies to determine the surface area and volume of rectangular solids.

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DATA ANALYSIS AND PROBABILITY

The student will collect, organize, analyze, interpret, and display data in tables and graphs and determine the probabilities of outcomes in simple experiments.

D		Collect data using observations, surveys, and experiments.
D		Understand how data-collection methods could affect the results.
A	**DP**	Represent and interpret data in bar graphs and pictographs.
D		Represent data using pictographs, bar graphs, tables, circle graphs, and line graphs.
D		Interpret data displayed in pictographs, bar graphs, tables, circle graphs, and line graphs.
D		Use measures of central tendency (i.e., mean, median, and mode).
A	**DP**	Determine the mean, median, and mode of a data set.
I		Find the range of a data set.
D		Make predictions and justify conclusions based on data.
A	**AT**	Make predictions based on data.
D		Design investigations to address a question.
D		Examine various graphical representations of data to evaluate how accurately the data is depicted.
I		Explain the importance of sample size in investigations.
D		Describe the likelihood or chance of events as likely, unlikely, certain, equally likely, or impossible.
A	**DP**	Determine the most likely, least likely, or equally likely outcomes in simple experiments.
D		Use a sample space to predict the probability of an event.
A	**DP**	Represent the likelihood of an event using a fractional number from zero to one.

MATHEMATICS
Sixth Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers; and estimate, compute, and solve problems.

Key	Reporting Category	
A	**N**	Identify the place value of a given digit.
D		Read, write, and represent whole numbers and decimals in expanded notation.
D		Develop understanding of equivalent number representations (i.e., fractions, decimals, and percents).
A	**N**	Represent numbers using a variety of models and equivalent forms (i.e., whole numbers, mixed numbers, fractions, decimals, and percents).
A	**N**	Compare and order whole numbers, fractions, decimals, and percents using the appropriate symbol (<, >, and =).
A	**N**	Connect whole numbers, mixed numbers, fractions, and decimals to locations on the number line.
D		Demonstrate understanding of percents greater than 100 and less than one.
A	**N**	Connect ratios to a variety of models, real-world situations, and symbolic representations.
D		Identify a ratio using three forms: 3 to 5; 3/5; 3:5.
D		Determine if two ratios form a proportion, and find the missing number in a proportion.
A	**N**	Identify prime and composite numbers up to 50.
I		Develop meaning for integers using real-world examples.
I		Represent integers with concrete objects, pictures, and symbols.
D		Develop meaning for number theory concepts (i.e., divisibility, factors, and multiples).
D		Explain how arithmetic operations on fractions and decimals affect the results.
D		Use the associative and commutative properties of addition and multiplication to simplify computations with integers, fractions, and decimals.
D		Use the distributive property to simplify computations with integers, fractions, and decimals.
A	**N**	Apply order of operations when computing with whole numbers.
D		Apply order of operations when computing with decimals.
D		Use the inverse relationships of addition and subtraction and multiplication and division to simplify computations and solve problems.
D		Compute with whole numbers, fractions, decimals, and percents in problem-solving situations (e.g., mental computation, estimation, calculators, computers, and paper and pencil).
A	**N**	Compute efficiently and accurately with whole numbers, fractions, and decimals.
D		Analyze procedures for computing with fractions, decimals, and integers.
A	**R**	Solve one-step real-world problems involving whole numbers and decimals.
D		Solve one-step real-world problems involving fractions.
D		Estimate the answers to computations involving whole numbers, fractions, and decimals in real-world problems.
A	**N**	Use estimation to select a reasonable answer to a computation involving whole numbers, fractions, and/or decimals.
I		Recognize when an estimate is more appropriate than an exact answer in a variety of problem situations.
A	**N**	Select a reasonable solution to a real-world division problem in which the remainder must be considered.

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ALGEBRA

The student will analyze and use symbols to generalize patterns with, use properties of operations, and analyze change in various situations.

D		Represent, analyze, and extend geometric and numerical patterns.
A	**AT**	Extend geometric and numerical patterns.
A	**AT**	Generalize patterns in data represented in tables.
D		Generalize patterns in data represented in graphs.
A	**AT**	Apply function rules.
D		Develop an initial conceptual understanding of different uses of variables.
D		Represent mathematical statements and real-world situations using symbols.
A	**AT**	Select an equation that represents a given mathematical relationship.
A	**AT**	Evaluate algebraic expressions for a given value of the variable.
A	**AT**	Find missing addends or factors represented as variables in simple equations.
I		Model algebraic expressions using manipulatives, technology, and paper and pencil.
I		Make a graph to represent a simple real-world problem or situation.
D		Describe how changes in one quantity or variable result in changes in another.
A	**R**	Extend rate charts to solve real-world word problems.

GEOMETRY

The student will analyze and describe characteristics and properties of 2- and 3-dimensional shapes, locate and specify points on a grid, and use geometric concepts (e.g., symmetry and transformations) and reasoning to solve problems.

D		Describe, classify, and understand relationships among types of two-dimensional figures.
A	**G**	Classify two-dimensional geometric figures using properties.
A	**G**	Classify angles as acute, obtuse, right, and straight.
D		Identify and use appropriate mathematical language to describe characteristics of lines (e.g., parallel, perpendicular, and intersecting).
A	**G**	Identify parallel, perpendicular, and intersecting lines.
A	**G**	Classify quadrilaterals using their defining properties.
D		Describe similarity and congruence.
D		Plot a given set of points in Quadrant I of a coordinate system, use ordered pairs to describe or specify points, and find the distance between 2 points on the x- or y-axis.
A	**ME**	Determine the distance between two points on the x- or the y- axis in Quadrant I.
A	**AT**	Use ordered pairs to describe given points in Quadrant 1 of a coordinate system.
A	**G**	Identify the results of transformations of two-dimensional figures (e.g., slides/translations, flips/reflections, and turns/rotations).
D		Predict, and describe the results of transformations of two-dimensional figures (e.g., slides/translations, flips/ reflections, and turns/rotations).
D		Describe line and rotational symmetry in two-dimensional figures.
D		Describe a motion or a series of motions that will show that two shapes are congruent.
D		Draw two-and three-dimensional geometric figures with specified properties, (e.g., side lengths, angle measure).
D		Identify and build a three-dimensional object from a two-dimensional representation (net) of that object and vice versa (e.g., cube, rectangular prism, pyramid, cone, or cylinder).
A	**G**	Use spatial reasoning to identify the three-dimensional figure created from a two-dimensional representation (net) of that figure (i.e., cube, rectangular prism, pyramid, cone, or cylinder).
D		Use visualization and spatial reasoning (e.g., geometric models) to solve real-world problems.

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MEASUREMENT

The student will determine time, length, perimeter, area, weight, capacity, and temperature and solve real-world problems involving measurement.

D		Demonstrate understanding of both metric and customary systems of measurement.
A	**ME**	Convert from one unit to another within the same system (metric and customary).
D		Identify relationships among units within the same system (metric and customary).
D		Identify and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.
A	**ME**	Select units of appropriate size and type to measure angles, perimeter, area, capacity, volume, and weight.
D		Estimate measurements involving length, perimeter, circumference, area, and volume.
A	**ME**	Use strategies to estimate perimeter and area of rectangles.
A	**ME**	Apply formulas to determine the area of rectangles and triangles.
D		Complete investigations to develop formulas to determine the circumference of circles.
D		Determine the area of triangles and parallelograms using a formula.
D		Use a variety of manipulatives to develop formulas to determine the area of trapezoids and circles.
D		Explore surface area and volume of selected prisms and cylinders using models and manipulatives.
A	**ME**	Solve problems involving ratio and proportion.
A	**R**	Solve real-world problems involving elapsed time.
A	**R**	Solve real-world problems involving perimeter and area of rectangles.
A	**R**	Use scales to read maps.
D		Solve problems involving measurement using ratio and proportion.
D		Recognize the need for measurement precision.

DATA ANALYSIS AND PROBABILITY

The student will collect, organize, analyze, interpret, and display data in tables and graphs and determine the probabilities of outcomes in simple experiments.

D		Formulate questions, design studies, and collect real-world data.
D		Understand how data-collection methods affect the nature of the data set.
D		Examine various representations of data to evaluate how accurately the data is depicted.
A	**R**	Interpret bar and line graphs to answer questions and solve real-world problems.
D		Determine, use, and interpret measures of center and spread (e.g., mean, median, mode, and interquartile range).
A	**DP**	Determine the mean of a data set.
A	**DP**	Determine the mode of a data set.
A	**DP**	Determine the median from a stem-and-leaf-plot.
A	**DP**	Connect data sets and their graphical representations (i.e., bar graphs, circle graphs, and stem-and-leaf-plots).
A	**AT**	Make conjectures and predictions based on data (e.g., in a chart, table, or graph).
D		Explain the importance of sample size in investigations.
D		Conduct a survey using random sampling.
A	**DP**	Determine if a sample is biased.
I		Make conjectures to formulate new questions for future studies.
I		Model situations by devising and carrying out experiments and simulations.
D		Make and test conjectures about the results of experiments and simulations.
A	**DP**	Use a tree diagram or organized list to determine all possible outcomes of a simple compound event.
A	**DP**	Represent the likelihood of an event using a number from 0-1.

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MATHEMATICS
Seventh Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers; and estimate, compute, and solve problems.

Key	Reporting Category	
M		Identify the place value of a given digit.
I		Develop meaning for perfect squares (e.g., 1, 4, 9, and 16).
I		Develop meaning for square roots.
I		Use exponential notation for powers of whole numbers.
I		Use a variety of models to demonstrate the relationships within the real number system (e.g., Venn diagrams, webs).
A	**N**	Represent numbers using a variety of equivalent forms (i.e., mixed numbers, fractions, decimals, percents, and integers).
A	**N**	Compare rational numbers using the appropriate symbol (<, >, and =).
A	**N**	Connect rational numbers to locations on a number line.
A	**N**	Connect percents greater than 100 and percents less than one to real-world situations.
A	**N**	Use ratios to represent quantitative relationships.
D		Understand and use ratios and proportions to represent quantitative relationships.
A	**N**	Identify the opposite and the reciprocal of a rational number.
D		Use concrete, pictorial, and symbolic representations for integers, including locations on a number line.
D		Apply number theory concepts to solve problems (e.g., divisibility, factors, multiples, composite numbers, prime numbers, prime factorization, and relatively prime).
A	**N**	Identify prime and composite numbers up to 50.
A	**N**	Compute efficiently and accurately with whole numbers, fractions, and decimals.
D		Understand the meaning and effects of arithmetic operations with fractions and decimals.
D		Use models to demonstrate meaning and effects of arithmetic operations with integers.
M		Apply the associative and commutative properties of addition and multiplication to simplify computations with integers, fractions, and decimals.
A	**N**	Apply order of operations when computing with whole numbers (no more than two parentheses and no exponents).
D		Apply order of operations when computing with decimals and fractions.
M		Understand and use the inverse relationships of addition and subtraction and multiplication and division to simplify computations and solve problems.
D		Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem solving situations (e.g., mental computation, estimation, calculators, number line, computers, and paper and pencil).
D		Analyze procedures for computing with fractions, decimals, and integers.
D		Estimate the results of rational number computations in real-world situations.
A	**N**	Use estimation strategies to select a reasonable solution to a computation involving rational numbers.
D		Determine if the results of rational number estimates and computations are reasonable.
A	**N**	Select a reasonable solution to a real-world division problem in which the remainder must be considered.
A	**R**	Solve one- and two-step real-world problems involving whole numbers, fractions, and decimals.
D		Solve two-step real-world problems involving percents.
D		Develop methods for solving problems involving proportions (e.g., scaling, and finding equivalent ratios).

KEY
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ALGEBRA

The student will analyze and use symbols to generalize patterns, use properties of operations, and analyze change in various situations.

D		Represent, analyze, and extend geometric and numerical patterns.
A	**AT**	Extend geometric and numerical patterns.
I		Develop understanding for arithmetic sequences.
A	**AT**	Generalize patterns in data represented in tables and graphs.
A	**R**	Extend rate charts to solve real-world problems.
A	**AT**	Apply function rules.
D		Create function rules.
D		Demonstrate understanding of different uses of variables.
A	**AT**	Represent mathematical statements and real-world situations using symbols.
I		Translate one-variable verbal and written expressions into algebraic expressions.
A	**AT**	Evaluate algebraic expressions given the value of two or more variables.
A	**AT**	Solve one-step linear equations.
A	**AT**	Identify whole numbers that satisfy a given one-variable inequality.
D		Model algebraic equations with manipulatives, technology, and paper and pencil.
A	**R**	Solve real-world problems involving one-step linear equations.
I		Explore relationships between symbolic expressions and graphs of lines.
A	**GR**	Select a scatterplot to represent data presented in tabular form.
D		Create a scatterplot to represent data presented in a tabular form.
D		Describe the relationship between two quantities represented in a scatterplot.
D		Describe how changes in one quantity or variable result in changes in another.
A	**GR**	Interpret graphs which represent rates of change.
D		Use unit rates to solve problems (e.g., miles per hour, and words per minutes).

GEOMETRY

The student will analyze and describe characteristics and properties of 2- and 3-dimensional shapes, locate and specify points on a grid, and use geometric concepts (e.g., symmetry and transformations) and reasoning to solve problems.

A	**G**	Determine congruence of line segments, angles, and polygons.
A	**G**	Classify triangles by angle, size, and length of sides.
D		Compare and classify triangles by angle**,** size**,** and length of sides.
A	**G**	Determine the measure of an angle of a triangle, given the measures of the other two angles.
A	**G**	Classify polygons by properties.
D		Compare and classify polygons by properties.
D		Use appropriate mathematical language to describe similarity and congruence.
D		Locate and specify points on the coordinate plane.
A	**GR**	Use ordered pairs to describe given points in a coordinate system.
D		Relate symmetry and congruence to reflections (flips) about a line or to other transformations.
A	**G**	Identify the results of transformations of two-dimensional figures (i.e., turns/rotations, flips/reflections, slides/translations).
M		Use appropriate tools and methods to draw geometric objects with specified properties, (e.g., side lengths, and angle measure).

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M		Identify and build a three-dimensional object from a two-dimensional representation (net) of that object and vice versa.
A	**R**	Apply spatial reasoning and visualization to solve real-world problems.

MEASUREMENT

The student will determine time, length, perimeter, area, weight, capacity, and temperature and solve real-world problems involving measurement.

M		Understand both metric and customary systems of measurement.
A	**ME**	Convert from one unit to another within the same system.
A	**ME**	Select units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.
D		Understand, select, and use units of appropriate size and type to measure angles, perimeter, areas, surface area, and volume.
A	**ME**	Estimate length, perimeter, circumference, area, and volume using a variety of strategies.
A	**ME**	Determine the distance between two points on the x- or the y-axis in Quadrant I.
D		Select and apply techniques and tools to accurately measure length, perimeter, area, volume, and angles to appropriate levels of precision.
A	**ME**	Apply formulas to determine the areas of rectangles, triangles, parallelograms, trapezoids, and circles.
D		Develop and use formulas to determine the circumference of circles.
A	**ME**	Find or estimate area of irregular and complex shapes.
I		Develop strategies to determine the surface area and volume of selected prisms and cylinders.
D		Construct tables and graphs to represent rates of change.
A	**R**	Solve problems involving scale factors using ratios and proportions.

DATA ANALYSIS AND PROBABILITY

The student will collect, organize, analyze, interpret, and display data in tables and graphs and determine the probabilities of outcomes in simple experiments.

M		Formulate questions, design studies, and collect real-world data.
D		Construct, interpret, and use multiple-bar graphs, multiple-line graphs, and circle graphs displaying real-world data.
A	**DP**	Interpret circle graphs displaying real-world data.
A	**DP**	Interpret bar and line graphs to answer questions and solve real-world problems.
D		Find, use, and interpret measures of center and spread (e.g., mean, interquartile range).
A	**DP**	Determine the mean for a data set.
A	**DP**	Determine the median for a data set.
A	**GR**	Make predictions based on data.
D		Make conjectures and predictions based on data.
D		Recognize misleading representations of data.
A	**DP**	Connect data sets and their graphical representations (i.e., bar graphs, stem-and-leaf plots, box plots, and scatterplots).
D		Discuss and understand the relationship between data sets and their graphical representations (e.g., bar graphs, line graphs, circle graphs, histograms, stem-and-leaf plots, box plots, and scatterplots).
D		Make conjectures and predictions based on data.
A	**AT**	Use proportional thinking to make conjectures about results of experiments and simulations.

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D		Make conjectures to formulate new questions for future studies.
D		Determine the probability for an outcome in an experiment.
A	**DP**	Connect the symbolic representation of a probability to an experiment.
D		Construct a tree diagram to determine all possible outcomes of a simple event.
A	**DP**	Use a tree diagram or make an organized list to determine all possible outcomes of a simple compound event.

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MATHEMATICS
Eighth Grade

NUMBER AND OPERATIONS

The student will identify, represent, order, and compare numbers; and estimate, compute, and solve problems.

Key	Reporting Category	
M		Recognize the place value of a given digit.
I		Use exponents to express a monomial written in expanded form.
A	**N**	Determine the square roots of perfect squares (<169).
D		Use a variety of models to demonstrate the relationships within the real number system (e.g., Venn diagrams and webs).
A	**R**	Work flexibly with fractions, decimals, and percents to solve one- and two-step word problems.
D		Compare and order fractions, decimals, and percents.
A	**N**	Compare rational numbers using the appropriate symbol (<, >, and =).
D		Locate and specify whole numbers, fractions, decimals, percents, and integers on the number line.
A	**N**	Determine the approximate locations of rational numbers on a number line.
D		Develop meaning for percents greater than 100 and less than one and identify examples.
M		Use appropriate mathematical language and symbols to express numerical relationships (e.g., <, >, and =).
D		Understand and use ratios and proportions to represent quantitative relationships.
A	**N**	Use ratios and proportions to represent real-world situations (i.e., scale drawings and probability).
A	**N**	Use exponential, scientific, and calculator notation to represent large numbers in real-world situations.
A	**N**	Identify the opposite and the reciprocal of a rational number.
M		Use concrete, pictorial, and symbolic representations of integers.
D		Apply number theory concepts to solve problems (e.g., divisibility, factors, multiples, composite numbers, prime numbers, prime factorization, and relatively prime).
D		Understand the meaning and effects of arithmetic operations with fractions, decimals, and integers.
M		Use the associative and commutative properties of addition and multiplication to simplify computations with integers, fractions, and decimals.
D		Use the distributive property to simplify computations with integers, fractions, and decimals.
A	**N**	Apply order of operations in computing with rational numbers using no more than two parentheses and exponents 1 and 2.
D		Understand and use the inverse relationships of addition and subtraction, multiplication and division, and squaring and finding square roots to simplify computations and to solve problems.
D		Select and use appropriate methods and tools for computing with whole numbers, fractions, decimals, percents, and integers in problem-solving situations (e.g., mental computation, estimation, calculators, computers, and paper and pencil).
A	**N**	Compute efficiently and accurately with whole numbers, fractions, decimals, and percents.
M		Develop and analyze procedures for computing with fractions, decimals, and integers.
A	**N**	Use estimation strategies to select a reasonable solution to a real-world problem involving computing with rational numbers.
D		Judge the reasonableness of the results of rational number estimates and computations.
D		Solve multi-step real-world problems involving whole numbers, fractions, decimals, and percents.
D		Solve multi-step real-world problems involving whole numbers, fractions, decimals, and percents.
I		Raise rational numbers to whole number powers.

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D		Develop, analyze, explain, and use methods for solving problems involving proportions (e.g., scaling and finding equivalent ratios).
A	**R**	Calculate rates involving cost per unit to determine the best buy.

ALGEBRA

The student will analyze and use symbols to generalize patterns, use properties of operations, and analyze change in various situations.

D		Represent, analyze, and generalize a variety of patterns with tables, graphs, words, and (when possible) symbolic rules.
A	**AT**	Generalize a variety of patterns with symbolic rules.
D		Develop understanding for arithmetic and geometric sequences.
D		Relate and compare different forms of representation for a relationship.
A	**AT**	Represent situations and solve real-world problems using symbolic algebra.
D		Identify functions as linear or nonlinear.
I		Compare and contrast properties of functions from tables, graphs, or equations.
A	**AT**	Formulate multi-step equations that represent relationships and real-world situations.
I		Develop meaning for intercept and slope.
I		Use a variety of forms to represent linear relationships.
A	**AT**	Generate equivalent forms for simple algebraic expressions.
D		Recognize and generate equivalent forms for simple algebraic expressions.
A	**AT**	Evaluate a first-degree algebraic expression given values for two or more variables.
A	**AT**	Solve one- and two-step linear equations involving integers.
D		Use a variety of methods to solve real-world problems involving multi-step linear equations (e.g., manipulatives, technology, and paper and pencil).
A	**AT**	Apply given formulas to solve real-world problems.
A	**AT**	Solve one-step linear inequalities.
A	**GR**	Connect the appropriate graph to a linear equation.
I		Identify the graphical representation of the solution to a one-variable linear inequality.
I		Develop understanding for particular values of patterns, relationships, and functions (e.g., x- and y- intercepts, slope, and maximum and minimum values).
D		Use a variety of representations to solve real-world problems (e.g., graphs, tables, and equations).
I		Compare linear relationships to non-linear relationships.
A	**GR**	Connect symbolic expressions and graphs of lines.
A	**GR**	Interpret graphs which represent rates of change.
D		Develop meaning for rate of change in real-world situations.

GEOMETRY

The student will analyze and describe characteristics and properties of 2- and 3-dimensional shapes, locate and specify points on a grid, and use geometric concepts (e.g., symmetry and transformations) and reasoning to solve problems.

D		Describe, classify, and understand relationships among types of two- and three-dimensional objects using their defining properties.
A	**G**	Classify types of two- and three-dimensional objects using their defining properties.
A	**G**	Identify relationships among the angles (i.e., complementary, supplementary, interior, exterior, vertical, and corresponding).
D		Understand relationships among the angles (e.g., complementary, supplementary, interior, exterior, vertical, and corresponding).

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A	**G**	Solve problems using angle relationships (i.e., complementary, supplementary, interior, exterior, vertical, and corresponding).
A	**G**	Determine the measure of an angle of a triangle given the measures of the other two angles.
A	**G**	Apply relationships among the angles and side lengths of similar geometric figures.
A	**G**	Recognize similar geometric figures.
D		Determine congruence of line segments, angles, and polygons by direct comparison of given attributes.
D		Develop an understanding of the Pythagorean theorem and use it to solve real-world problems.
D		Graph points in the coordinate system.
A	**GR**	Use ordered pairs to describe given points in a coordinate system.
D		Describe sizes, positions, and orientations of shapes under transformations (e.g., rotations, translations, reflections, and dilations).
D		Relate symmetry and congruence to reflections about a line.
D		Use appropriate tools and methods to draw geometric objects with specified properties, (e.g., side lengths, and angle measure).
D		Use two-dimensional representations of three-dimensional objects to visualize.
A	**R**	Apply spatial reasoning and visualization to solve real-world problems.
A	**R**	Apply geometric ideas and relationships in areas outside the mathematics classroom (i.e., art, science, and everyday life).

MEASUREMENT

The student will determine time, length, perimeter, area, weight, capacity, and temperature and solve real-world problems involving measurement.

M		Understand both metric and customary systems of measurement.
A	**ME**	Convert from one unit to another within the same system.
A	**ME**	Select units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.
A	**ME**	Estimate length, perimeter, circumference, area, and volume using a variety of strategies.
D		Select and apply techniques and tools to accurately measure length, perimeter, area, volume, and angles to appropriate levels of precision.
A	**ME**	Apply formulas to find the circumference and area of circles.
A	**ME**	Apply formulas to find the area of triangles, parallelograms, and trapezoids.
A	**ME**	Estimate or find the area of irregular and complex shapes.
I		Apply given formulas to find volume of selected prisms and cylinders.
D		Compare and contrast the volumes of a variety of geometric solids.
A	**R**	Solve real-world problems involving rate/time/distance (i.e., d = rt).
A	**R**	Solve problems involving scale factors using ratios and proportion.
A	**ME**	Solve real-world problems using the Pythagorean theorem (no radicals).
D		Construct tables and graphs to represent rates of change.
D		Find measures using proportional relationships and properties of similar figures.
D		Determine the measures of angles by applying angle relationships (e.g., complementary, supplementary, interior, exterior, and vertical corresponding).

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DATA ANALYSIS AND PROBABILITY

The student will collect, organize, analyze, interpret, and display data in tables and graphs and determine the probabilities of outcomes in simple experiments.

D		Formulate questions, design studies, and collect real-world data for investigations using a variety of collection methods (e.g., random sampling and simulations).
A	**DP**	Interpret appropriate graphical representations of data (i.e., histograms, box plots, and scatterplots).
D		Select, create, and use appropriate graphical representations of real-world data (e.g., histograms, box plots, and scatterplots).
D		Determine and interpret measures of center and spread (e.g., mean, median, and interquartile range).
A	**DP**	Determine the mean of a given set of real-world data.
A	**DP**	Determine the median of a given set of real-world data (even number of data).
I		Develop meaning for frequency, distribution, and outliers.
A	**DP**	Connect data sets and their graphical representations (i.e., histograms, stem-and-leaf plots, box plots, and scatterplots).
D		Connect data sets and their graphical representations (e.g., bar graphs, line graphs, and circle graphs).
A	**GR**	Make conjectures and predictions based on data.
A	**DP**	Recognize misleading presentations of data.
I		Develop meaning for lines of best fit.
A	**DP**	Identify an appropriate sample to test a given hypothesis.
D		Make conjectures to formulate new questions for future studies.
I		Develop meaning of mutually exclusive events.
A	**DP**	Connect the symbolic representation of a probability to an experiment.
D		Use a variety of methods to compute probabilities for compound events (e.g., multiplication, organized lists, tree diagrams, and/or area models).
I		Distinguish between theoretical and experimental probability.
D		Find the probability of dependent and independent events.

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Gateway

Gateway Mathematics		
Standard Number:		**1.0 Number and Operations**
Performance Indicators	**Reporting**	**As documented through state assessment -**
State:	**Category**	
		At Level 1, the student is able to
A	**NS**	• select the best estimate for the coordinate of a given point on a number line (only rational);
A	**NS**	• identify the opposite of a rational number;
A	**NS**	• determine the square root of a perfect square less than 169;
A	**AE**	• use exponents to simplify a monomial written in expanded form;
A	**NS**	• apply order of operations when computing with integers using no more than two sets of grouping symbols and exponents 1 and 2;
A	**NS**	• select a reasonable solution for a real-world division problem in which the remainder must be considered.
		At Level 2, the student is able to
A	**NS**	• order a given set of rational numbers (both fraction and decimal notations);
A	**NS**	• identify the reciprocal of a rational number;
A	**AE**	• add and subtract algebraic expressions;
A	**NS**	• multiply two polynomials with each factor having no more than two terms;
A	**NS**	• use estimation to determine a reasonable solution for a tedious arithmetic computation;
A	**NS**	• select ratios and proportions to represent real-world problems (e.g., scale drawings, sampling, etc.).
		At Level 3, the student is able to
A	**RW**	• apply the concept of slope to represent rate of change in a real-world situation.
Performance Indicators		**As documented through teacher observation -**
Teacher:		
		At Level 1, the student is able to • connect a variety of real-world situations to integers; • use manipulatives to represent commutative and associative properties of addition and multiplication; • investigate alternate algorithms that show the relationship of division to subtraction and multiplication to addition; • analyze prime and composite numbers; • compare and contrast the GCF and LCM of a set of numbers; • refine strategies for estimating whole numbers, fractions, and percentages.
		At Level 2, the student is able to • probe the relationships among various subsets of the real number system; • compare and contrast the GCF and LCM of a set of algebraic expressions; • construct a number line to describe the absolute value of a number as distance from zero; • model operations using real-world situations and physical representations; • perform operations on matrices using appropriate technology (addition, subtraction, and scalar multiplication); • explore various representations of absolute value.
		At Level 3, the student is able to

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		• research the history of prime numbers and their uses; • scrutinize approximate values of real numbers such as pi and the square root of two.

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Standard Number:		2.0 Algebra
Performance Indicators	Reporting	As documented through state assessment -
State:	Category	
		At Level 1, the student is able to
A	SSG	• extend a geometric pattern;
A	AE	• extend a numerical pattern;
A	AE	• translate a verbal expression into an algebraic expression;
A	AE	• evaluate a first degree algebraic expression given values for one or more variables;
A	EI	• solve one- and two-step linear equations using integers (with integral coefficients and constants).
		At Level 2, the student is able to
A	EI	• select the algebraic notation which generalizes the pattern represented by data in a given table;
A	EI	• translate a verbal sentence into an algebraic equation;
A	GG	• select the graph that represents a given linear function expressed in slope-intercept form;
A	EI	• solve multi-step linear equations (more than two steps, variables on only one side of the equation);
A	EI	• solve multi-step linear equations (more than two steps, with variables on both sides of the equation);
A	EI	• solve multi-step linear equations (more than two steps, with one set of parentheses on each side of the equation);
A	GG	• select the linear graphs that models the given real-world situation described in a narrative (no data set given);
A	GG	• select the linear graph that models the given real-world situation described in a tabular set of data;
A	AE	• evaluate an algebraic expression given values for one or more variables using grouping symbols and/or exponents less than four;
A	GG	• determine the slope from the graph of a linear equation (no labeled points);
A	RW	• apply the concept of rate of change to solve real-world problems;
A	EI	• select the appropriate graphical representation of a given linear inequality;
A	GG	• select the nonlinear graph that models the given real-world situation or vice versa;
A	EI	• identify the graphical representation of the solution to a one-variable inequality on a number line.
		At Level 3, the student is able to
A	RW	• solve multi-step linear inequalities in real-world situations;
A	GG	• recognize the graphical transformation that occurs when coefficients and/or constants of the corresponding linear equations are changed;
A	GG	• determine the domain and/or range of a function represented by the graph of real-world situations, ∗ Select the system of equations that could be used to solve a given real-world problem. ∗ Find the solution to a quadratic equation given in standard form (integral solutions and a leading coefficient of one).

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		* Select the solution to a quadratic equation given solutions represented in graphical form (integral solutions and a leading coefficient of one). * Select one of the factors (x + 3) of a quadratic equation (integral solutions and a leading coefficient of one). * Select the discriminant of a quadratic equation (integral solutions and a leading coefficient of one). * ***Recommended by the 2003 committee as additional state performance indicators. Additional state performance indicators will begin to be assessed during 2005-2006.***
Performance Indicators		**As documented through teacher observation -**
Teacher:		
		At Level 1, the student is able to • analyze rational number patterns; • describe in writing the pattern for real-world data listed in a function table.
		At Level 2, the student is able to • produce an equation to describe the relationship between data sets; • explore patterns including Pascal's Triangle and a Fibonacci sequence; • solve a system of two linear equations using the graphing, elimination, and substitution methods; • defend the selection of a method for solving a system of equations; • represent algebraic expressions and operations using manipulatives; • model the steps for solving simple linear equations using manipulatives; • write an equation that symbolically expresses a problem solving situation; • justify correct results of algebraic procedures; • distinguish between a function and other relationships.
		At Level 3, the student is able to • analyze "families of functions" using technology.

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Standard Number:		**3.0 Geometry**
Performance Indicators	**Reporting**	**As documented through state assessment -**
State:	**Category**	
A	**GG**	**At Level 1, the student is able to** • identify ordered pairs in the coordinate plane.
A **A**	**SSG** **SSG**	**At Level 2, the student is able to** • apply the given Pythagorean theorem to a real life problem illustrated by a diagram (no radicals in answer); • apply proportion and the concepts of similar triangles to find the length of a missing side of a triangle.
A	**SSG**	**At Level 3, the student is able to** • calculate the distance between two points given the Pythagorean theorem and the distance formula.
Performance Indicators		**As documented through teacher observation -**
Teacher:		
		At Level 1, the student is able to • describe real-world uses of geometric formulas and relationships; • discuss issues related to estimating areas of irregular-shaped figures for real-world uses (i.e., fencing, painting, laying carpet, or purchasing wallpaper or border).
		At Level 2, the student is able to • explain how to determine if a triangle is a right triangle when given the measurements of all three sides; • illustrate the Pythagorean theorem by measuring the length, width, and diagonals of rectangular objects; design area models to illustrate the Pythagorean theorem.
		At Level 3, the student is able to • determine the height of an object that is difficult to measure by using the properties of similar triangles.

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Standard Number:		**4.0 Measurement**
Performance Indicators	**Reporting**	**As documented through state assessment -**
State:	**Category**	
		At Level 1, the student is able to
A	**SSG**	• estimate the area of irregular geometric figures on a grid;
A	**RW**	• calculate rates involving cost per unit to determine the best buy (no more than three samples);
A	**SSG**	• apply the given formula to determine the area or perimeter of a rectangle.
		At Level 2, the student is able to
A	**SSG**	• apply the given formula to find the area of a circle, the circumference of a circle, or the volume of a rectangular solid.
		At Level 3, the student is able to
A	**AE**	• select the area representation for a given product of two one-variable binomials with positive constants and coefficients.
Performance Indicators		**As documented through teacher observation -**
Teacher:		
		At Level 1, the student is able to • justify the selection of a unit of measure in specific situations; • defend estimates of the perimeter and/or area of rectangles and triangles; • discover and explain formulas used to compute area and volume.
		At Level 2, the student is able to • describe the procedure for determining the area of a composite shape in a real-world situation; • generalize area formulas using manipulatives for a parallelogram, a triangle, and a trapezoid; • defend an estimate for the volume of a container; • relate the volume of a container to its shape; • analyze precision, accuracy, tolerance, and approximate error in measurement situations.
		At Level 3, the student is able to • discover the dimensions of a rectangle when given its area and the relationship between two adjacent sides; • describe how changes in the dimensions of figures affect perimeter, area, and volume.

KEY
I = Introduced D = Developing A = State Assessed M = Mastered

REPORTING CATEGORY
NS = Number Sense/Theory AE = Algebraic Expression EI = Equations & Inequalities
RW = Real World Problems GG= Graphs & Graphing SSG = Spatial Sense & Geometric Concepts

NOTE: "A" Indicates the state curriculum (CRT or Writing) assessment only.
All the skills ("I" … "D" … "A" … "M") are addressed in classroom assessment.

Standard Number:		**5.0 Data Analysis and Probability**
Performance Indicators	**Reporting**	**As documented through state assessment -**
State:	**Category**	
		At Level 1, the student is able to
A	**RW**	• determine the mean (average) of a given set of real-world data (no more than five two-digit numbers);
A	**RW**	• interpret bar graphs representing real-world data;
A	**RW**	• interpret circle graphs (pie charts) representing real-world data.
		At Level 2, the student is able to
A	**GG**	• choose the matching linear graph given a set of ordered pairs;
A	**GG**	• make a prediction from the graph of a real-world linear data set;
A	**RW**	• determine the median for a given set of real-world data (even number of data).
		At Level 3, the student is able to
A	**RW**	• apply counting principles of permutations or combinations in real-world situations.
Performance Indicators		**As documented through teacher observation -**
Teacher:		
		At Level 1, the student is able to • design a strategy for collecting real-world data for a scientific investigation; • collect and organize real-world data.
		At Level 2, the student is able to • graph real-world data using a variety of representations; • debate the selection of a graphical representation which best describes specific data; • model situations to determine theoretical and experimental probabilities; • judge the validity of claims made in probabilistic situations; • defend the sampling method chosen to conduct a survey.
		At Level 3, the student is able to • debate possible conclusions that can be supported by given data; • make predictions from real-world data using a line of best fit.

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